Math 563A1, Homework 4
Due November 16, 2007
Prof. Takashi Kimura

1. (10 points) Let S denote a cone with the surface patch $\sigma(u, v) := (u \cos v, u \sin v, au)$ where a is some constant. Show that a unit speed geodesic $\alpha(t) = \sigma(u(t), v(t))$ is characterized by the equation

$$u = c \sec\left(\frac{v}{\sqrt{1+a^2}} + D\right).$$

   For $a = 1$, determine c and D for the geodesic connecting $(1, 0, 1)$ and $(0, 1, 1)$ and compare the arclength of this geodesic between these points to the arclength of the parallel cirecle joining the points.

2. (10 points) Pressley Problem 8.10

3. (10 points) Pressley Problem 8.15

4. (10 points) Pressley Problem 8.16

5. (10 points) Pressley Problem 8.17